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The Photon Structure at medium x and Q^2 in Deep Inelastic Electron-Photon Scattering at $\sqrt{s_{ee}} = 90 - 172\,\mathrm{GeV}$

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Deep inelastic electron-photon scattering is studied in the Q^2 range from 6 to 400 GeV^2 using the full samples of LEP data taken with the OPAL detector at centre-of-mass energies close to the Z^0 mass[1] and at centre-of-mass energies of 161 and 172 GeV. The data correspond to an integrated luminosity of 156.4 pb^{-1} close to the Z^0 mass and to 18 pb^{-1} at higher energies.

Energy flow distributions and other properties of the measured hadronic final state are compared with the predictions of Monte Carlo models, including HERWIG and PYTHIA. Sizeable differences are found between the data and the models, especially at low values of the scaling variable x.

New measurements are presented of the photon structure function $F_2^\gamma(x,Q^2)$ as a function of x in bins of Q^2, with sytematic errors that allow for uncertainties in the description of the final state by different Monte Carlo models. These uncertainties contribute significantly to the systematic error on F_2^γ. In addition the evolution of $F_2^\gamma(x,Q^2)$ with Q^2 in the x range $0.1 < x < 0.6$ is studied based on the available data at all centre-of-mass energies.

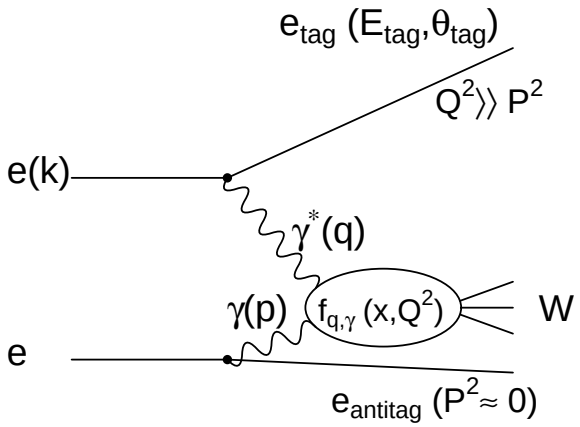

Figure: A diagram of deep inelastic electron-photon scattering.

[1] OPAL Collaboration, K. Ackerstaff et al., CERN-PPE/96-155, Accepted by Zeit. f. Physik C